

## Crop residue Management

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### Introduction

Crop residues are parts of the plants left in the field after crops have been harvested and threshed. Crop residue management (CRM) is a conservation practice that usually involves reduction in the number of passes over the field with tillage implements and/or in the intensity of tillage operations, including the elimination of ploughing. This practice is designed to leave sufficient residue on the soil surface to reduce wind or water erosion. These practices should be done to conserve the soil and water as well. Residue management is the emerging challenge for sustainable growth of Indian agriculture and environmental protection mainly in Indo-Gangetic plains. Out of 620 MT crop residues produced annually in the country, 234MT is surplus and 30% of it is contributed by rice and wheat. Approximately 16% of the total crop residues being burnt, 62% is contributed by rice and wheat. Participated states are Bihar, Andhra Pradesh, Haryana, Punjab, MP, UP, Maharashtra, West Bengal, Rajasthan, Tamil Nadu etc. Maximum residue burning is practised in Punjab, UP, Haryana, Maharashtra and MP.

### Residue generated, residue surplus and burned in major states

S.No.	State	Residue generation	Residue surplus	Residue burned
1	Punjab	50.75	24.83	19.65
2	Uttar Pradesh	59.97	13.53	11.92
3	Haryana	27.83	11.22	9.08
4	Maharashtra	46.45	14.67	7.42
5	Madhya Pradesh	33.18	10.22	6.91

### **Why do farmers burn residues in field?**

Now days harvesters are being used for harvesting the agricultural crops due to which stubbles/ crop residue left there in the field. Manual collection and destruction of the crop residue is very time and labour consuming. Number of livestock is also declining in our country and composting is also a lengthy process. In this situation, burning is the easiest option for the farmers.

### **Why Crop residues should not be burned?**

Burning of crop residue results in loss of nutrients like N, P, K & S, release of smoke and soot particles. Soil hardening and erosion will occur due to no cover, mortality of active beneficial soil bacteria. It will also cause environmental pollution (affecting human health) & green house (GH) gases emission.

### **Loss of nutrients due to crop residue burning**

Crop residue burning also results in the loss of various nutrients. For example, burning of paddy straw results in loss of 5.5 KG nitrogen, 1.2 KG sulphur, 2.3 KG phosphorus, 25.0 KG potash and 400 KG organic carbon.

### **Burning of Crop residues and Emissions**

One tonne straw on burning releases 3KG particulate matter, 60 KG CO, 1460 KG CO<sub>2</sub>, 199 KG ash and 2 KG SO<sub>2</sub>.

### **Diversified uses of crop residue**

There are many uses of crop residues except burning. Crop residues can be used in many ways i.e. for livestock feed, for mulching, as an energy source, as bedding material, for making compost, for paper making, biochar production and it can also be used in mushroom production.

### **Management of crop residues**

We can manage crop residues by using agriculture machineries viz., **Straw Reaper, Paddy straw chopper, zero-Till seed-cum-Fertilizer Drill, Happy seeder, Mulcher machine, Baler, Super straw Management System (Super SMS)**. Among them the most effective and used machines are described as below:

### **Paddy straw chopper**

It is a perfect machine for chopping all types of crop residues/straw such as wheat, paddy, maize, sorghum, sunflower etc. In single operation, it chops the left behind straw/stubbles and spread it on the ground. The chopped and spreaded stubbles can be easily buried in the soil by the use of single operation of Rotavator or disc harrow. Machine consists of a rotary shaft mounted with blades named as flail to harvest the straw and chopping units consist of Knives.



### **Advantages**

- Reduces air pollution
- Reduces fuel and labour cost

### **Zero -Till seed cum fertilizer drill**

Zero-Till farming is a way of growing wheat/other crops without tillage or disturbing the soil in paddy /other crop harvested fields.

### **Advantages**

- Reduces labour and saves time
- Saves fuel
- Reduces machinery wear
- Improves soil tilth

- Increases soil organic matter
  - Traps soil moisture
  - Reduces soil erosion
- Improves air and water quality

### Happy seeder

Happy seeder is one of the unique techniques which are used for sowing seed without burning of crop residue. In this machine a Rotor unit is attached at front of seedling unit that cut and spread straw in between the rows as mulch. In this machine a Rotor unit is attached at front of seeding unit that cuts & spread straw in between the rows as mulch. Majority of the residue is not disturbed and seed is sown in a single pass.



### Advantages

- Removes the need to burn rice stubble before planting the next crop, therefore reduces air pollution.
- Direct sowing also reduce soil disturbance, enabling it to retain more nutrients, moisture and organic content
- Saves money as less time is needed in carrying out field operations, which in turn reduce fuel and labour costs

### Baler

It is used to compress raked residues of rice, wheat, fodders, sugarcane, legumes etc into compact bales that are easy to handle, transport and store.

### Advantages



- Crop residues are turned into bales which can be used for animal feeding as well as bio fuels
- Creates alternative business for farmers to sell bales to power plants
- Save the environment from air pollution

### **Super straw management system**

The super SMS cuts the straw in small pieces and scatters it around behind the tail of the combine.

### **Advantages**

- Easy direct sowing of wheat with happy seeder
- The scattered straw helps in conserving the soil moisture



### **Recommendations for Promotion of Residue Management Machinery**

- State Governments may be given full assistance for promotion through awareness by way of demonstration training and capacity building
- Higher slabs of subsidy may be given to farmers for procurement of machinery
- More custom hiring centres may be promoted for easy reach of costly equipments for small and marginal farmers at village level
- Incentivize farmers for adoption of various residue management operations
- Support for funding R&D/technological up-gradation to states
- Strengthening of Agricultural Engineering Extension services (special Directorate of Agricultural Engineering) on the pattern of Madhya Pradesh and Tamil Nadu

- Farm mechanization components in different schemes like National Food Security Mission (NFSM), National Mission on Oilseeds and Oil palm (NMOOP) and Mission for Integrated Development of Horticulture (MIDH) etc. can be brought under single umbrella of SMAM for effective implementation and uniformity of assistance.

**Conclusion:**

It can be concluded that crop residues are very beneficial and economical if they are managed properly. So except burning, it should be managed in different eco friendly ways that will be useful for the farmer and the environment as well. Because burning of crop residue harms the ultimate source of nutrients to the crops i.e. the soil. So to conserve the soil and environment this is a very small but most important step that a farmer should take.

